

## **Application of sputtering for absorption of inorganic nano material on the PET surface**

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### **ABSTRACT**

In this study, As a previous stage to manufacture disposable tent for military camouflage, we examine possibility of inorganic material absorption on PET surface. In order to, we created unevenness by sputtering process on PET surface and made absorption with Zirconium (ZIA) that has nano particles. and we went on study to its effect.

### **1. INTRODUCTION**

PET fabric has characteristics that are excellent prevention of crease, resistibility of chemicals, stability of shape and so on. It is very useful in various extensively, but it has a defect to durability because it is dense, hydrophobic and high crystallization parts form outer skin. it is very difficult to absorption of inorganic material to fabric surface. To improve this defect, we created unevenness with sputtering treatment on PET surface and made absorption nano inorganic. we have purpose to improve durability by increasing absorption rate on fabric surface.

### **2. EXPERIMENT**

#### 2.1 Samples and reagents

The experiment used controlled PET fabric based on a standard in KS K 0905, ZIA dispersion liquid, PVA (Polyvinyl Alcohol 500, DUKSAN PURE CHEMICALS CO.,LTD. KOREA),

PEG(Polyethylene Glycol 400, DUKSAN PURE CHEMICALS CO.,LTD. KOREA)

#### 2.2 Sputtering

Sputter etching treatment used ULVAC VPS-020(Shinku-Kiko, Japan). It constituted a diameter 80mm and a fixation flat electrode of distance of electrode 45mm. It used argon as discharge gas. Under discharge, we treated with sputtering etching at electric pressure 1kV, electric current 6mA, the degree of a vacuum 0.05torr for 30min.

#### 2.3 ZIA Experiment

PET treated sputtering for 30 min and a heat treatment at 110°C after supersonic waves washing. After a saturated Zirconium solution and a 2% PVA aqueous solution combined 1:1 rate, it sprayed on sputtered PET fabric. it is pressed 8kg/cm<sup>2</sup> by blown air and dried in 40°C. After washing, it is coating as PEG and heat treatment. (at 130°C , for 4min)

### **3. RESULTS AND DISCUSSION**

Table 1 showed the amount of heat according to treatment condition. We understand a little change of the amount of heat by (A) and (B) in spite of absorption of inorganic material. It seems to be that the amount of absorption of inorganic material is little or the capacity of warmth retaining property is week. But that is expected to change the amount of heat

more than before. If the size of unevenness is enough to adhere nano-inorganic material and we control sort or concentration of the binder. And Table 1 showed that the amount of heat is change by a laundry but a little change by the number of the laundry. In this result, we came to the conclusion that it is removed a lot by laundry one time or its coating agent effort is week.

Table 1 Comparison of the amount of heat with treatment condition (unit: J/g)

Samples		the amount of heat	
		Heat absorption	Generation of heat
A	Blank (Untreated)	50.08	33.81
B	Sputtering + Nano material	46.05	40.53
C	Sputtering + Nano material + PEG Coated	47.29	36.39
D	Sputtering +Nano material + PEG Coated + Laundry 1 time	57.16	38.02
E	Sputtering +Nano material + PEG Coated + Laundry 2 time	49.16	35.85
F	Sputtering +Nano material + PEG Coated + Laundry 3 time	51.00	35.41

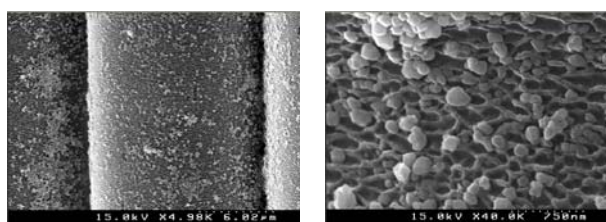


Fig. 1 SEM image of PET textile that sorbs inorganic material with Sputter etching

Fig. 1 Showed that unevenness was created on PET surface by sputter etching treatment and nano-inorganic material was absorbed evenly. We thought it is good opportunity that reflects characteristics of

inorganic material on fabric surface. This study is expected as a good method that enhanced fabric surface characteristics. This experiment has object to absorption of inorganic material on fabric surfac. And we are ongoing study much more than before.

#### 4. REFERENCES

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